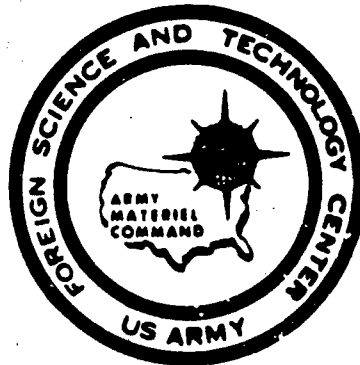


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# US ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER



FOR PROTECTION OF FOOD PRODUCTS

By

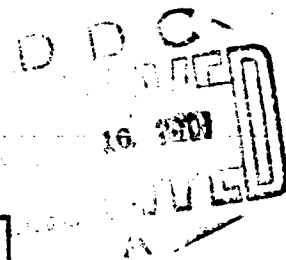
A. Borovikov

COUNTRY: USSR

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TECHNICAL TRANSLATION

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As a result of a nuclear, chemical, or biological attack by the enemy, unprotected food and drinking products may be contaminated. Their use will severely infect and poison people. Nuclear blasts and radioactive substances are very dangerous for foodstuffs. If supplies of them are located in open places, they are destroyed within a distance of 0.2 km of the nuclear blast. In specially dug and prepared trench and foundation areas, they can withstand one and a half times as much force.

Radioactive substances falling like a cloud infect food products by entering storehouses with the air through cracks, ventilation channels, casements and even through the destruction of the roofs on storerooms. The degree of infection of products depends on their structure and consistency. For example, compact and non-porous substances (meat, animal fats in a solid condition, potatoes, foods) are infected only on their surface, while compact, porous substances (bread, rusks, biscuits) are infected both on the surface and in the pores. Dry products (sugar, salt, meal, grains, groats) are infected on the upper layer and liquids (milk, vegetable oil, beverages, etc.) are infected throughout their mass.

Radioactive dust can penetrate unprotected meal, salt and sugar to a depth of 0.5 to 1 cm. They poison the surface of frozen meat carcasses.

The most dangerous poisonous substances for food products are soman, sarin, mustard gas and lewisite. They evaporate slowly and outside agents do not change them much so that they are retained on the products for a long time.

Food products are mainly contaminated as a result of the activity of the poisonous fumes of substances at the moment they are used and also during their subsequent evaporation. The vapors of poisonous substances slowly penetrate drinking products in the summer and to a lesser degree and considerably slower in the winter. The depth depends on the dosage

and concentration of the poisonous substances, their physical-chemical properties, the surrounding temperature, the kind of product and the defensive properties of the wrapping, packing and means of transportation.

Biological agents are also dangerous for food products. Many products provide a good source of food for microbes. The microbes remain on them in good condition and even reproduce. For example, the spores of the anthrax microbe will remain in water for two months, plague microbes will remain in milk for as long as three months, the microbes of Asiatic cholera will remain in butter up to 30 days, in black bread up to four days, and in vegetables and fruits up to eight days. Cooked meats provide good protection for food against botulism, one of the toxins of a very infectious nature.

Just what means and resources will provide protection for food and drinking products against nuclear, chemical and biological attacks? They are many. The cost of sealing warehouses, technological equipment and means of transportation is insignificant but guarantees their cleanliness.

In transporting protected meal, groats, sugar, salt, vegetable oil, milk, etc., the grain elevators, railroad and automobile tanks, and sea and river boats can be thoroughly protected by hermetically sealed hatches, and metallic containers, casks, and flasks. In case of extreme necessity suitably treated cement factories, gasoline stations and other specialized equipment can be used for these purposes with permission of the public health authorities.

During transportation, baked bread and perishable products are kept in refrigerated and temperature-controlled trucks.

If food products, grain and vegetables are shipped by highway vehicles of the usual types, it is necessary to take suitable protective measures: cover the load on top and sides with a tarpaulin, a polyethylene film or some other solid material. It is also possible to use straw mats. The bottom of the automobile body must be covered by plywood, cardboard, paper or a film. On railroads food products are transported in refrigerator and ice cars which provide dependable protection against contamination.

In treating and improving means of transportation, it is desirable to make sure they are air tight, since this improves the sanitary and hygienic conditions of the food to a considerable extent, cuts down natural losses in transportation and, in the end, guarantees protection against mass agents of infection.

Finally, basic supplies of food and drinking materials are kept in warehouses, on bases, in elevators and in refrigerators so that their protection assumes particularly great significance. It is first of all necessary to protect products from destruction by the shock wave and by its bright irradiation. In order to attain this goal, it is necessary to plan ahead of time where and how warehouses, bases, elevators, etc., can best be built. The wide radius of activity of a shock wave and its bright irradiation make it necessary to disperse them as far as possible.

In order to protect them from radioactive and poisonous substances, and also from bacterial agents, food products must be kept away from foreign agents insofar as possible. This is achieved by making warehouses, depots, bases and other premises hermetic (air tight). Making places hermetic, as experimentation has shown, is an economic expedient, even for peacetime. It makes it possible to preserve foods better, increases the length of time they can be kept and improves their sanitary and hygienic condition.

Before constructing new warehouses, elevators and industrial plants for preliminary treatment of large supplies of food, hermetic protection should be provided for the structures. This can be done by replacing the light openings (windows) by hollow glass blocks whose limit of mechanical resistance is many times greater than that of glass and equal to  $40 \text{ kg/cm}^2$ . Openings for doors and windows intended for mounting chain and belt conveyors and other pieces of machinery, and other cracks and so on must be hermetically sealed (closed up) by using various types of material, including improvised ones.

No less important is the wider use of containers for bulk storage and of automatic machinery for bulk transportation of meal, sugar, groats and other products. Ventilated equipment should be closed with bolts and hooks.

If it is not possible to guarantee the desired hermeticity of warehouses and basic industrial shops, it is necessary to have available tarpaulins, polymer materials, or rubberized covering which are suitable for protecting food products from radioactive substances and bacterial agents and can significantly reduce the danger of poisonous substances.

In the warehouses the products are placed on shelves covered with thick paper, tarpaulin or a polyethylene film. If they are stored in stacks (piles), they must be covered with a two-layer protective covering. The length and breadth of the bottom layer must exceed the length and breadth of the stack (pile) by 100-120 cm. The length of the covering is the length of the stack plus two times its height plus 100 cm. The

width of the covering equals the width of the stack plus twice its height plus another 100 cm. In preparing a covering, its individual sections are sewn together, polyethylene film is welded by heat, and paper and cellophane are glued together with a 10% solution of polyvinyl alcohol. The covering is placed on the stack in such a way that the edges along the floor are approximately the same width in every direction. Then the ends of the cover are evened out with the edges of the bottom cover on the floor and turned over two or three times in the direction of the stack, first turning it along the long edge, and then along the width. The folds are squeezed together every 100-150 cm or something is placed on them to hold them down.

Sugar, salt, meal, bread and fats must be covered with extreme care because they do not always receive any heat treatment before they are used. During procurement on factory grounds and at bread stations grain, vegetables and fruit should be poured into packages or placed in stacks (in boxes). They must also be covered.

These same means of protection should be used to protect food in dining rooms and canteens. Finally, the best thing is to keep food products in refrigerators, temperature controlled food boxes, bins and in protective wrappings and packages.

But how are we to make sure of protection for foodstuffs in family apartments?

Everyone, including school children, must know the rules for protecting food products from infection. Many products are served in special packaging. If not, they should be. Meal, groats, salt, sugar, vermicelli, dried fruit, bread, biscuits and rusks should be wrapped up in three or four layers of paper and placed in a thick polymer film, lined on the inside with oilcloth, or tightly woven boxes, baskets or paper bags. Regular polyethylene packages are suitable for this purpose.

Heavy oilcloth, lacquered cellophane, paper, doubled foil, rubberized cloth and waxed paper provide good protection for food products from contamination by poisonous substances and bacterial agents. Simple cellophane, ordinary wrapping paper and tarpaulins do not fully protect food products from contamination because of their physical qualities; they are looser materials and absorb fumes from poisonous substances.

Glass and plastic jars, enamel pans whose lids should be closed and lined at the top with oilpaper, oilcloth, etc., are very good for storing these materials. The point of contact between the lid and the pot should preferably be bonded together by plastic or insulating tape.

Perishable products: meat, fish, butter, margarine and cooked meats should be kept in glass jars or enamel pots with their tops tightly closed and wrapped with polyethylene film, oilpaper or some other material. Meat and fish cannot be kept in copper or zinc pots without a tin lining. This could lead to people being poisoned by copper and zinc oxide.

It is recommended that all well wrapped packages be kept in thick cupboards, bins and refrigerators.

Canned meat, fish, vegetables and fruit, vegetable butter, oil butter and condensed milk will not spoil at all in metallic and glass jars, nor will fruit juice, sweet butter and margarine in cartons and wooden boxes in the original wrapping.

Baby foods, instant coffee, dried concentrated soups, powdered milk, meat and fish wrapped in polymer film, bread intended for long storage and wrapped in polyethylene film are all well protected from radioactive substances and bacterial agents. These types of packing reduce a hundred times the danger of food being infected by poisonous substances.

It is also possible to use the above mentioned kinds of wrapping, packing and means of protecting food products in the village. However, it must be realized that the number of products there is significantly larger. Therefore grain, meal, groats, sugar and salt must be kept in heavy bags and stored in bins, boxes or barrels, lined with oilcloth, rubberized cloth, tarpaulins, etc. If there are any cracks in them, they are to be sealed up with putty or plaster. The tops of the boxes, bins and barrels should be well adjusted and closed tightly.

Potatoes, cabbages and other fresh vegetables and fruits must be kept in sheds and storerooms where they are suitably covered with tarpaulins, straw mats or heavy paper with the same covering above them or a layer of earth 15-20 cm deep. Good protection from all sources of mass infection is provided when products are kept in pits and trenches covered with a layer of earth 20-25 cm deep. Salted vegetables are kept in barrels with tight fitting tops. Regular wooden barrels with an inside lining of polyethylene protects food products very well from poisonous substance and bacterial agents falling upon them. Milk, vegetable butter and other products can be kept in cans, canisters and glass jars with close fitting tops.

In cellars, basements and sheds where food products are kept, rather simple methods of sealing are carried out: fitting doors tightly,

plugging cracks, filling air holes from inside with solid insulation and fitting a soft metallic netting outside as protection against rodents.

While using various materials for packing, one should realize that many of them (e.g., sacking, tarpaulins, paper and straw mats) do not guarantee full protection of food products against infectious and poisonous substances or against bacterial agents. Therefore it is desirable to use other materials too (oilcloth, rubberized cloth, polymer films or several layers of heavy paper). It must always be remembered that protection for food and drinking products against agents of mass infection is one of the most important responsibilities of civil defense.



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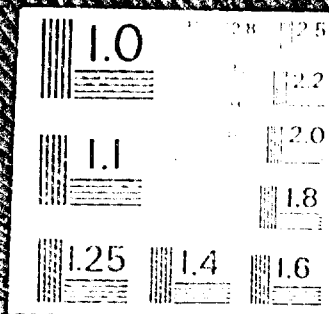
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